306.35565X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: REDECKER et al

Serial No.: 08/894,351

Filed: October 27, 1997

For: Gas Producing Mixtures

Art Unit: 3641

Examiner: A. Felton

APPELLANTS' BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

September 8, 2005

Sir:

This appeal brief is being filed under 37 CFR 41.37 in connection with the appeal of the final rejection in the above-identified application, a notice of appeal having been filed March 8, 2005.

REAL PARTY IN INTEREST

The real party in interest is Delphi Technologies, Inc. of Troy, Michigan, the assignee of the subject application.

RELATED APPEALS AND INTERFERENCES

Upon information and belief, there is no other prior or pending appeal, interference or judicial proceeding known to Appellant, Appellants' legal representative, or the assignee which may be related to, directly affect, or be directly affected by, or have a bearing on the Board's decision in this pending appeal.

STATUS OF CLAIMS

Claims 1-5 and 8-31 are pending in the application. Claims 5, 8, 11-26 and 28-30 have been withdrawn from consideration. Claims 1-4, 9, 10, 27 and 31 stand finally rejected and are on appeal.

STATUS OF AMENDMENTS

An Amendment under 37 C.F.R. 41.33 is being filed on even date in order to correct clerical errors and matters of form in dependent claims 20, 27 and 31. Claims Appendix A contains a copy of the claims involved in the appeal prior to entry of the Amendment under 37 C.F.R. 41.33. While Claims Appendix B contains a copy of the claims involved in the appeal in the form in which they would be after entry of the Amendment under 37 C.F.R. 41.33.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The claims on appeal are directed to a gas-producing composition for gas generators. Gas generators are being used to an increasing extent in, for example, motor vehicles for life-saving purposes. Prior art gas-producing mixtures usually contain sodium azide. However, sodium azide is poisonous and can readily react with heavy metals to form extremely dangerous and vigorously reacting compounds. There have been attempts, therefore, to use other substances in place of sodium azide. See, page 1, lines 3-18 of Appellants' specification.

While other nitrogen-containing compounds can be used in place of sodium azide, when the gas charges undergo reaction to inflate airbags for motor vehicle safety, proportions of toxic gases, e.g., carbon monoxide or nitrogen oxides, can be present besides non-toxic working gases such as nitrogen, carbon dioxide and hydrogen. Limits such as the maximum allowable concentration (MAC) in the work-place, are set having regard to peak loads for these gases. See, page 2, lines 29-36 of Appellants' specification.

The gas-producing composition of the present invention solves the foregoing problems by providing, as a fuel, at least one nitrogen-containing compound selected from the group consisting of tetrazole, triazole, triazine, cyanic acid, urea, and their derivatives and their salts, and, as an oxidant, a combination of zinc peroxide, potassium perchlorate and least one nitrate. See, independent claim 1. The at least one nitrite may be sodium nitrate or strontium nitrite. See, claim 27. See, e.g., page 4, lines 27-35 and page 8, lines 7-12 of Appellants' specification.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-4, 9, 10, 27 and 31 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,472,647 to Blau et al., U.S. Patent No. 5,500,059 to Lund et al. (Lund et al. '059), U.S. Patent No. 5,472,534 to Wardle et al., U.S. Patent No. 5,516,377 to Highsmith et al., European patent application publication number EP 0 607 446 to Yoshida (Yoshida '446) and European patent publication number EP 0 519 485 to Redecker et al. (Redecker et al. '485).

Claims 1-4, 9, 10, 27 and 31 stand rejected under the judicially created doctrine obviousness-type double patenting as being unpatentable over claims 1-15, 18 and 19 of U.S. Patent No. 6,453,816.

ARGUMENTS

Rejection Under 37 U.S.C 103(a)

Appellants have found that, in gas-producing compositions for gas generators in which the fuel is at least one nitrogen-containing compound selected from the group consisting of tetrazole, triazole, triazine, cyanic acid, urea, and their derivatives or their salts, unexpectedly advantageous results can be achieved when the oxidant is a combination of zinc peroxide, potassium perchlorate and at least one nitrate. None of the references applied by the Examiner either individually or in combination suggest using, as an oxidant for such a gas-producing composition, the combination of zinc peroxide, potassium perchlorate and at least one nitrate, as presently claimed.

The Blau et al. patent discloses a method for preparing an anhydrous tetrazole gas generant composition. This patent discloses that the oxidizer is selected from the group consisting of a metal peroxide, an inorganic nitrate, an inorganic nitrite, a metal oxide, a metal hydroxide, an inorganic chlorate, an inorganic perchlorate, or a mixture thereof. It is disclosed that the use of metal oxides or hydroxides as oxidizers is particularly useful (see, column 6, lines 12-16 of Blau et al.). Nowhere in Blau et al. is there any suggestion to use, as an oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate. It does not appear the Blau et al. patent recognizes any advantages to using any particular type of oxidizers from the group of compounds disclosed, other than the use of metal oxides or hydroxides. Certainly there is no recognition that the particular combination presently claimed, i.e., zinc peroxide, potassium perchlorate and at least

one nitrate, should be used. The sole example and sole comparative example in Blau et al. teach the use of copper oxide as the oxidizer. Clearly, based on the teachings of Blau et al., one of ordinary skill in the art would not have been motivated to use, as an oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate in the gas-producing composition presently claimed.

The Lund et al. '059 patent discloses a gas generant composition that includes an oxidizer and a 5-aminotetrazole fuel. The oxidizer is disclosed to be generally a metal oxide or metal hydroxide. At column 4, lines 65 to column 5, line 17 of Lund et al. '059, various oxidizers and combinations of oxidizers are disclosed. At column 5, line 18, it is disclosed that the preferred oxide is cupric oxide. In fact, most of the examples involve the use of compositions including cupric oxide as the oxidizer. Examples 10-13 of Lund et al. involve compositions using mixtures of cupric oxides and other oxidizers. However, nowhere in Lund et al. '059 is it disclosed that the gas-producing composition should use, as an oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate.

The Wardle et al. patent discloses a gas generant composition containing non-metallic salts of 5-nitrobarbituric acid. It is disclosed that the oxidizer can be an inorganic nitrite, an inorganic nitrate, a metal peroxide, a metal oxide, a metal hydroxide, an inorganic perchlorate, or an inorganic chlorate. The oxidizers are described more fully at column, lines 1-27 of Wardle et al. Nowhere in Wardle et al. is it disclosed that the oxidant should be a combination of zinc peroxide, potassium perchlorate, and at least one nitrate. In fact, at column 3, lines 12-15 of Wardle et al., it is disclosed that the oxidizer should be free of cations of alkali metals, such as sodium or potassium, when the composition is used as the gas generant in a

supplemental safety restraint system. Thus, the Wardle et al. patent teaches away from the combination of oxidants presently claimed, including potassium perchlorate.

The Highsmith et al. patent discloses gas generating compositions having at least one salt of 5-nitraminotetrazole and at least one oxidizer selected from among inorganic nitrates, inorganic nitrites, metal oxides, metal peroxides, organic peroxides, inorganic perchlorates, inorganic chlorates, metal hydroxides, and mixtures thereof. Individual oxidizers and mixtures are described more fully at column 3, lines 23-48 of Highsmith et al. However, nowhere in Highsmith et al. is it suggested that the gas-producing composition should include, as an oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate.

Yoshida '446 relates to an air bag gas-generating composition consisting of azodicarbonamide and a halogen oxo acid salt as an oxidizing agent. The Examiner refers to Table 1 of this document which shows the use of $KCLO_4$ as the halogen oxo acid salt oxidizer and CuO and/or CaO_2 as a combustion control catalyst. However, nowhere in Yoshida '446 is it disclosed that the oxidizer should be a combination of zinc peroxide, potassium perchlorate and at least one nitrate.

Redecker et al. '485 discloses gas generating compositions. As noted by the Examiner, this document discloses the use of zinc peroxide and other oxidizers. However, there is no suggestion to use, as an oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate.

While the various references applied by the Examiner disclose numerous oxidants, alone or in some mixtures, there is no suggestion in any of the references, to use, as an oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate. Without such a suggestion, the obviousness rejection is improper.

To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp,* 277 USPQ 972, 973 (Bd. of Pat. App. and Interf.1985); *In re Rouffet,* 149 F.3d 1350, 1357, 47 USPQ 2d 1453, 1457-1458 (Fed. Cir. 1998); *In re Fine,* 837 F.2d 1071, 5 USPQ 2d 1596 (Fed. Cir. 1988).

The Examiner has cited a number of older cases for the proposition that "where the ingredients are well-known and combined for their known properties, the combination is obvious, absent unexpected results." However, this general conclusion is not the objective evidence and specific factual findings necessary to support an obviousness rejection. *In re Lee,* 277 F.3d 1388, 1342-1344, 61 USPQ 2d. 1430, 1433-1434 (Fed. Cir. 2002).

In any event, Appellants' specification establishes the unexpectedly advantageous results achieved by the gas-producing composition, especially using, as an oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate. For example, at page 15 of Appellants' specification, it is disclosed that Example 1 describes the reaction of 5-aminotetrazole with a binary mixture of oxidants, i.e., sodium nitrate and potassium perchlorate (see the table on page 14). The reaction gas composition contains1800 ppm carbon monoxide in the reaction gases after combustion in a closed pressure bomb. On the other hand, in Example 2, the addition of only 1% of by weight of zinc peroxide surprisingly leads to a marked reduction in the proportion of carbon monoxide to 1100 ppm with otherwise unchanged test parameters. See, the table at the top of page 15, and page 15, lines

18-25 of Appellants' specification. The prior art applied by the Examiner does not suggest the gas-producing composition presently claimed or the unexpectedly advantageous results achieved thereby.

For the foregoing reasons, the rejection of the claims under 35 U.S.C. 103(a) should be reversed.

Obviousness-Double Type Patenting Rejection

Claims 1-15, 18 and 19 of U.S. Patent No. 6,453,816 relate to a composition for producing gas in a gas generator consisting of (a) a gas-generating mixture and (b) substances or mixtures of substances, i.e., a temperature fuse, which have lowered detonation points or decompositions than the gas generating mixtures and thermally decompose exothermically in a narrowly limited temperature range, the evolution of heat igniting the gas-generating mixture. It is claimed that the temperature fuse contains a compound selected from the group consisting of iron oxide and ferrocene, and a compound selected from the group consisting of oxalates, peroxidisulfates (persulfates), permanganates, nitrides, perborates, bismuthates, formates, nitrates, sulfamates, bromates, or peroxides.

In the first place, the '816 patent claims a composition including a temperature fuse while the presently claimed gas-producing composition comprises a fuel and an oxidant. Moreover, while the present claims require that the oxidant be a combination of zinc peroxide, potassium perchlorate and at least one nitrate, the claims of the '816 patent do not set forth such a combination as an oxidant. For the reasons noted above with respect to the rejection under 35 U.S.C. 103(a), one of ordinary skill in the art would not have been motivated to use, as an oxidant, the combination of zinc peroxide, potassium perchlorate and at least one nitrate

presently claimed.

Moreover, Appellants' specification contains evidence that the presently claimed composition provides unexpectedly advantageous results.

For the foregoing reasons, the obviousness-type double patenting rejection should be reversed.

CONCLUSION

For the foregoing reasons, the final rejections should be reversed.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, Deposit Account No. 01-2135 (Case: 306.35565X00), and please credit any excess fees to said deposit account.

Respectfully submitted,

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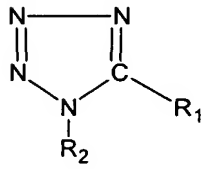
CLAIMS APPENDIX A

1. Gas-producing composition for gas generators, wherein said gas-producing composition comprises,

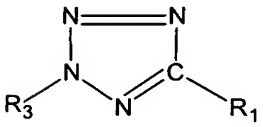
a) as fuel, at least one nitrogen-containing compound selected from the group consisting of tetrazole, triazole, triazine, cyanic acid, urea, and their derivatives or their salts;

b) as oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate.

2. Gas-producing composition according to claim 1, wherein said nitrogen-containing compound is one or more tetrazole derivatives of the formulae IA or IB:



IA



IB

wherein R_1 and R_2 or R_3 are identical or different and are hydrogen, hydroxy, amino, carboxy, an alkyl residue of 1-7 carbon atoms, an alkenyl residue of 2-7 carbon atoms, an alkylamino residue of 1-10 carbon atoms, an aryl residue, an arylamino residue, a

substituted aryl residue or a substituted arylamino residue, the substituted aryl residue or substituted arylamino residue being substituted by one or several substituents which are identical or different, and which are selected from the group consisting of an amino group, a nitro group and an alkyl group of 1-4 carbon atoms or a sodium, a potassium or a guanidinium salt of said tetrazole or tetrazole derivative.

3. Gas-producing composition according to claim 2, wherein R_1, is selected from the group consisting of hydrogen, amino, hydroxy, carboxyl, a methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tert-butyl, n-pentyl, n-hexyl, n-heptyl, methylamino, ethylamino, dimethylamino, n-heptylamino, n-octylamino, n–decylamino, tetrazole, phenylamino, phenyl, nitrophenyl, and aminophenyl; and R_2 or R_3 is selected from the group consisting of hydrogen, a methyl, ethyl, phenyl, nitrophenyl, and aminophenyl radical.

4. Gas-producing composition according to claim 1, wherein the nitrogen-containing compound is a tetrazole derivative selected from the group consisting of 5-aminotetrazole; lithium, sodium, potassium, zinc, magnesium, strontium or calcium 5-aminotetrazolate; 5-aminotetrazole nitrate, sulphate, or perchlorate; 1-(4-aminophenyl)-tetrazole, 1-(4-nitrophenyl)-tetrazole, 1-methyl-5-dimethyl-aminotetrazole, 1-methyl-5-methylamino-tetrazole, 1-methyltetrazole, 1-phenyl-5-aminotetrazole, 1-phenyl-5-hydroxytetrazole, 1-phenyltetrazole, 2-ethyl-5-aminotetrazole, 2-methyl-5-aminotetrazole, 2-methyl-5-carboxyltetrazole, 2-methyl-5-methylaminotetrazole, 2-methyltetrazole, 2-phenyltetrazole, 5-(p-tolyl)tetrazole, 5-diallylaminotetrazole, 5-dimethylaminotetrazole, 5-ethylaminotetrazole, 5-hydroxytetrazole, 5-methyltetrazole,

5-methylaminotetrazole, 5-n-decylaminotetrazole, 5-n-heptylaminotetrazole, 5-n-octylaminotetrazole, 5-phenyltetrazole, 5-phenylaminotetrazole, bis-(aminoganidine)-azotetrazole and diguanidinium-5,5'-azo-tetrazolate, 5,5'-bitetrazole and 5,5'-bi-IH-tetrazoleammonium compounds.

5. Gas-producing agent according to claim 1, characterised in that it contains:

as triazine derivatives, 1,3,5-triazine, as triazole derivatives, 1,2,4-triazole-5-one, 3-nitro-1,2,4-triazole-5-one, as cyanic acid derivatives, sodium cyanate, cyanuric acid, cyanuric acid esters, cyanuric acid amide (melamine), 1-cyanoguanidine, sodium dicyanamide, disodium cyanamide, dicyanodiamidine nitrate, dicyanodiamidine sulphate, and as urea derivatives biuret, guanidine, nitroguanidine, guanidine nitrate, aminoguanidine, aminoguanidine nitrate, thiourea, triaminoguanidine nitrate, aminoguanidine hydrogen carbonate, azodicarbonamide, tetracene, semicarbazide nitrate, as well as urethanes, ureides such as barbituric acid, and derivatives thereof.

Claim 6 (canceled)

Claim 7 (canceled)

8. Gas-producing agent according to claim 1, characterised in that the ratio of the oxidants in the gas-producing mixture is 1:2:10, with a total content of 60% by wt.

9. Gas-producing composition according to Claim 1, wherein the ratio of the nitrogen-containing compound to the oxidants is balanced such that on combustion of the gas-producing composition, oxygen is formed in excess.

10. Gas-producing composition according to Claim 1, wherein the composition further contains a combustion moderator in an amount up to 8%.

11. Gas-producing composition according to Claim 1, wherein the composition further contains a combustion moderator selected from the group consisting of metals, metal oxides, metal carbonates, metal sulphides and mixtures thereof.

12. Gas-producing agent according to claim 1, characterised in that it contains as combustion moderators sulphur, ferrocene and its derivatives.

13. Gas-producing agent according to claim 1, characterised in that it contains, as an addition, substances which are capable of reducing the content of the noxious gases nitrogen oxides and/or carbon monoxide.

14. Gas-producing composition according to Claim 1, wherein said gas-producing composition further comprises an additional substance selected from the group consisting of combustion moderators, noble metals, mixtures of these compounds, basically reacting substances selected from the group consisting of oxides, hydroxides, carbonates of alkali and alkaline earth metals, zinc, mixtures of these compounds, urea,

guanidine compounds having NH_2 groups selected from the group consisting of amidosulphonic acids, amido complexes, amides, and mixtures of these compounds.

15. Gas-producing agent according to claim 1, characterised in that the amount of additions used is about 10% by wt. in the charge and up to 75% by wt. in the outlet passages the amounts being based on the gas charge.

16. Gas-producing composition for gas generators, comprising nitrogen-containing compounds, wherein said gas-producing composition comprises,

a) as nitrogen-containing compound, a combination of aminotetrazole and calcium, magnesium or zinc salts, of aminotetrazole;

b) as oxidant, at least three compounds selected from the group consisting of peroxides, nitrates, chlorates and perchlorates; and

c) combustion moderators which are capable of influencing combustion and its rate by heterogeneous or homogeneous catalysis selected from the group consisting of zinc oxide and carbonates of zinc and calcium.

17. Gas-producing agent for gas generators, comprising nitrogen-containing compounds, characterised in that it contains:

a) as nitrogen-containing compound (fuel), urea, its salts, its derivatives and their salts, preferably biuret, guanidine, nitroguanidine, guanidine nitrate, aminoguanidine, aminoguanidine nitrate, thiourea, triaminoguanidine nitrate, aminoguanidine hydrogen carbonate, azodicarbonamide, dicyanodiamidine nitrate, dicyanodiamidine sulphate, tetracene and/or semicarbazide nitrate, as well as

urethanes, ureides such as barbituric acid, and their derivatives;

b) as oxidants, at least two compounds from the group of peroxides, nitrates, chlorates or perchlorates, preferably sodium nitrate and potassium perchlorate; and

c) combustion moderators which are capable of influencing the combustion and its rate by heterogeneous or homogeneous catalysis, preferably zinc oxide and the carbonates of zinc and calcium.

18. Gas-producing agent according to claim 17, characterised in that it contains as oxidants and contains as combustion moderators:

peroxides of alkali and alkaline earth metals, zinc peroxide, and peroxodisulphates of the said elements and ammonium peroxodisulphate, or mixtures of these compounds;

ammonium nitrate, nitrates of alkali and alkaline earth metals, in particular lithium nitrate, or mixtures of these compounds;

halogen oxycompounds of alkali or alkaline earth metals or of ammonium, preferably potassium perchlorate or ammonium perchlorate, or mixtures of these compounds, substances or mixtures thereof which are capable of influencing the combustion and its rate by heterogeneous or homogeneous catalysis, the proportion of these substances in the mixture amount up to 8%.

19. Method of producing a gas-producing agent for gas generators according to claim 1, characterised in that the nitrogen-containing compound or compounds (fuel) is/are mixed with the oxidants, the combustion moderators and optionally with further additions and the mixture is homogenized.

20. Method according to claim 20, characterised in that the gas-producing agent is compressed with the use of pressing aids, for example graphite, molybdenum sulphide, Teflon, talc, zinc stearate or boron nitride.

21. Method according to claim 20, characterised in that the blanks are coated.

22. Method according to claim 19, characterised in that a definite porosity of the blank is produced for control of the rate of combustion.

23. Life-saving system containing a gas-producing agent according to claim 1.

24. A method of use of the gas-producing agent according to claim 1 for the production of gas, comprising mixing elements (a), (b), (c) and optionally (d) of the gas-producing agent according to claim 1 to form a mixture, and homogenizing said mixture, wherein a gas is produced.

25. Gas-producing agent according to claim 16, characterised in that it contains as oxidants and contains as combustion moderators:

peroxides of alkali and alkaline earth metals, zinc peroxide, and peroxodisulphates of the said elements and ammonium peroxodisulphate, or mixtures of these compounds;

ammonium nitrate, nitrates of alkali and alkaline earth metals, in particular lithium nitrate, or mixtures of these compounds;

halogen oxycompounds of alkali or alkaline earth metals or of ammonium, preferably potassium perchlorate or ammonium perchlorate, or mixtures of these compounds, substances or mixtures thereof which are capable of influencing the combustion and its rate by heterogeneous or homogeneous catalysis, the proportion of these substances in the mixture amount up to 8%.

26. The gas-producing composition according to claim 1, further comprising additions which are capable of reducing the proportion of toxic gases.

27. The gas-producing composition according to claim 7, wherein said at least one nitrate is sodium nitrate or strontium nitrate.

28. The gas-producing composition according to claim 11, wherein the metals are selected from the group consisting of boron, silicon, copper, iron, titanium, zinc and molybdenum.

29. The gas-producing composition according to claim 14, wherein the noble metal is selected from the group consisting of palladium, ruthenium, rhenium, platinum, rhodium and oxides of the noble metals.

30. The gas-producing composition according to claim 16, wherein the aminotetrazone and salts of aminotetrazole are a combination of 5-aminotetrazole and salts of 5-aminotetrazole.

31. The gas-producing composition of Claim 1, wherein the nitrate is sodium nitrate or strontium nitrate.

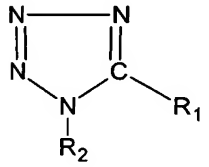
CLAIMS APPENDIX B

1. Gas-producing composition for gas generators, wherein said gas-producing composition comprises,

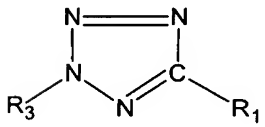
a) as fuel, at least one nitrogen-containing compound selected from the group consisting of tetrazole, triazole, triazine, cyanic acid, urea, and their derivatives or their salts;

b) as oxidant, a combination of zinc peroxide, potassium perchlorate and at least one nitrate.

2. Gas-producing composition according to claim 1, wherein said nitrogen-containing compound is one or more tetrazole derivatives of the formulae IA or IB:



IA



IB

wherein R_1 and R_2 or R_3 are identical or different and are hydrogen, hydroxy, amino, carboxy, an alkyl residue of 1-7 carbon atoms, an alkenyl residue of 2-7 carbon atoms, an alkylamino residue of 1-10 carbon atoms, an aryl residue, an arylamino residue, a

substituted aryl residue or a substituted arylamino residue, the substituted aryl residue or substituted arylamino residue being substituted by one or several substituents which are identical or different, and which are selected from the group consisting of an amino group, a nitro group and an alkyl group of 1-4 carbon atoms or a sodium, a potassium or a guanidinium salt of said tetrazole or tetrazole derivative.

3. Gas-producing composition according to claim 2, wherein R_1, is selected from the group consisting of hydrogen, amino, hydroxy, carboxyl, a methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tert-butyl, n-pentyl, n-hexyl, n-heptyl, methylamino, ethylamino, dimethylamino, n-heptylamino, n-octylamino, n–decylamino, tetrazole, phenylamino, phenyl, nitrophenyl, and aminophenyl; and R_2 or R_3 is selected from the group consisting of hydrogen, a methyl, ethyl, phenyl, nitrophenyl, and aminophenyl radical.

4. Gas-producing composition according to claim 1, wherein the nitrogen-containing compound is a tetrazole derivative selected from the group consisting of 5-aminotetrazole; lithium, sodium, potassium, zinc, magnesium, strontium or calcium 5-aminotetrazolate; 5-aminotetrazole nitrate, sulphate, or perchlorate; 1-(4-aminophenyl)-tetrazole, 1-(4-nitrophenyl)-tetrazole, 1-methyl-5-dimethyl-aminotetrazole, 1-methyl-5-methylamino-tetrazole, 1-methyltetrazole, 1-phenyl-5-aminotetrazole, 1-phenyl-5-hydroxytetrazole, 1-phenyltetrazole, 2-ethyl-5-aminotetrazole, 2-methyl-5-aminotetrazole, 2-methyl-5-carboxyltetrazole, 2-methyl-5-methylaminotetrazole, 2-methyltetrazole, 2-phenyltetrazole, 5-(p-tolyl)tetrazole, 5-diallylaminotetrazole, 5-dimethylaminotetrazole, 5-ethylaminotetrazole, 5-hydroxytetrazole, 5-methyltetrazole,

5-methylaminotetrazole, 5-n-decylaminotetrazole, 5-n-heptylaminotetrazole, 5-n-octylaminotetrazole, 5-phenyltetrazole, 5-phenylaminotetrazole, bis-(aminoganidine)-azotetrazole and diguanidinium-5,5'-azo-tetrazolate, 5,5'-bitetrazole and 5,5'-bi-lH-tetrazoleammonium compounds.

5. Gas-producing agent according to claim 1, characterised in that it contains:

as triazine derivatives, 1,3,5-triazine, as triazole derivatives, 1,2,4-triazole-5-one, 3-nitro-1,2,4-triazole-5-one, as cyanic acid derivatives, sodium cyanate, cyanuric acid, cyanuric acid esters, cyanuric acid amide (melamine), 1-cyanoguanidine, sodium dicyanamide, disodium cyanamide, dicyanodiamidine nitrate, dicyanodiamidine sulphate, and as urea derivatives biuret, guanidine, nitroguanidine, guanidine nitrate, aminoguanidine, aminoguanidine nitrate, thiourea, triaminoguanidine nitrate, aminoguanidine hydrogen carbonate, azodicarbonamide, tetracene, semicarbazide nitrate, as well as urethanes, ureides such as barbituric acid, and derivatives thereof.

Claim 6 (canceled)

Claim 7 (canceled)

8. Gas-producing agent according to claim 1, characterised in that the ratio of the oxidants in the gas-producing mixture is 1:2:10, with a total content of 60% by wt.

9. Gas-producing composition according to Claim 1, wherein the ratio of the nitrogen-containing compound to the oxidants is balanced such that on combustion of the gas-producing composition, oxygen is formed in excess.

10. Gas-producing composition according to Claim 1, wherein the composition further contains a combustion moderator in an amount up to 8%.

11. Gas-producing composition according to Claim 1, wherein the composition further contains a combustion moderator selected from the group consisting of metals, metal oxides, metal carbonates, metal sulphides and mixtures thereof.

12. Gas-producing agent according to claim 1, characterised in that it contains as combustion moderators sulphur, ferrocene and its derivatives.

13. Gas-producing agent according to claim 1, characterised in that it contains, as an addition, substances which are capable of reducing the content of the noxious gases nitrogen oxides and/or carbon monoxide.

14. Gas-producing composition according to Claim 1, wherein said gas-producing composition further comprises an additional substance selected from the group consisting of combustion moderators, noble metals, mixtures of these compounds, basically reacting substances selected from the group consisting of oxides, hydroxides, carbonates of alkali and alkaline earth metals, zinc, mixtures of these compounds, urea,

guanidine compounds having NH_2 groups selected from the group consisting of amidosulphonic acids, amido complexes, amides, and mixtures of these compounds.

15. Gas-producing agent according to claim 1, characterised in that the amount of additions used is about 10% by wt. in the charge and up to 75% by wt. in the outlet passages the amounts being based on the gas charge.

16. Gas-producing composition for gas generators, comprising nitrogen-containing compounds, wherein said gas-producing composition comprises,

a) as nitrogen-containing compound, a combination of aminotetrazole and calcium, magnesium or zinc salts, of aminotetrazole;

b) as oxidant, at least three compounds selected from the group consisting of peroxides, nitrates, chlorates and perchlorates; and

c) combustion moderators which are capable of influencing combustion and its rate by heterogeneous or homogeneous catalysis selected from the group consisting of zinc oxide and carbonates of zinc and calcium.

17. Gas-producing agent for gas generators, comprising nitrogen-containing compounds, characterised in that it contains:

a) as nitrogen-containing compound (fuel), urea, its salts, its derivatives and their salts, preferably biuret, guanidine, nitroguanidine, guanidine nitrate, aminoguanidine, aminoguanidine nitrate, thiourea, triaminoguanidine nitrate, aminoguanidine hydrogen carbonate, azodicarbonamide, dicyanodiamidine nitrate, dicyanodiamidine sulphate, tetracene and/or semicarbazide nitrate, as well as

urethanes, ureides such as barbituric acid, and their derivatives;

b) as oxidants, at least two compounds from the group of peroxides, nitrates, chlorates or perchlorates, preferably sodium nitrate and potassium perchlorate; and

c) combustion moderators which are capable of influencing the combustion and its rate by heterogeneous or homogeneous catalysis, preferably zinc oxide and the carbonates of zinc and calcium.

18. Gas-producing agent according to claim 17, characterised in that it contains as oxidants and contains as combustion moderators:

peroxides of alkali and alkaline earth metals, zinc peroxide, and peroxodisulphates of the said elements and ammonium peroxodisulphate, or mixtures of these compounds;

ammonium nitrate, nitrates of alkali and alkaline earth metals, in particular lithium nitrate, or mixtures of these compounds;

halogen oxycompounds of alkali or alkaline earth metals or of ammonium, preferably potassium perchlorate or ammonium perchlorate, or mixtures of these compounds, substances or mixtures thereof which are capable of influencing the combustion and its rate by heterogeneous or homogeneous catalysis, the proportion of these substances in the mixture amount up to 8%.

19. Method of producing a gas-producing agent for gas generators according to claim 1, characterised in that the nitrogen-containing compound or compounds (fuel) is/are mixed with the oxidants, the combustion moderators and optionally with further additions and the mixture is homogenized.

20. Method according to claim 19, characterised in that the gas-producing agent is compressed with the use of pressing aids, for example graphite, molybdenum sulphide, Teflon, talc, zinc stearate or boron nitride.

21. Method according to claim 20, characterised in that the blanks are coated.

22. Method according to claim 19, characterised in that a definite porosity of the blank is produced for control of the rate of combustion.

23. Life-saving system containing a gas-producing agent according to claim 1.

24. A method of use of the gas-producing agent according to claim 1 for the production of gas, comprising mixing elements (a), (b), (c) and optionally (d) of the gas-producing agent according to claim 1 to form a mixture, and homogenizing said mixture, wherein a gas is produced.

25. Gas-producing agent according to claim 16, characterised in that it contains as oxidants and contains as combustion moderators:

peroxides of alkali and alkaline earth metals, zinc peroxide, and peroxodisulphates of the said elements and ammonium peroxodisulphate, or mixtures of these compounds;

ammonium nitrate, nitrates of alkali and alkaline earth metals, in particular lithium nitrate, or mixtures of these compounds;

halogen oxycompounds of alkali or alkaline earth metals or of ammonium, preferably potassium perchlorate or ammonium perchlorate, or mixtures of these compounds, substances or mixtures thereof which are capable of influencing the combustion and its rate by heterogeneous or homogeneous catalysis, the proportion of these substances in the mixture amount up to 8%.

26. The gas-producing composition according to claim 1, further comprising additions which are capable of reducing the proportion of toxic gases.

27. The gas-producing composition according to claim 2, wherein said at least one nitrate is sodium nitrate or strontium nitrate.

28. The gas-producing composition according to claim 11, wherein the metals are selected from the group consisting of boron, silicon, copper, iron, titanium, zinc and molybdenum.

29. The gas-producing composition according to claim 14, wherein the noble metal is selected from the group consisting of palladium, ruthenium, rhenium, platinum, rhodium and oxides of the noble metals.

30. The gas-producing composition according to claim 16, wherein the aminotetrazone and salts of aminotetrazole are a combination of 5-aminotetrazole and salts of 5-aminotetrazole.

31. The gas-producing composition of Claim 1, wherein the at least one nitrate is sodium nitrate or strontium nitrate.

EVIDENCE APPENDIX

NONE

RELATED PROCEEDINGS APPENDIX

NONE